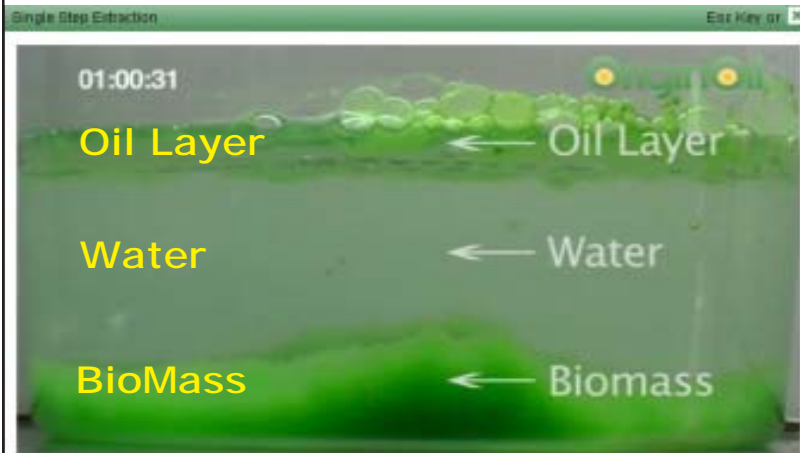


OriginOil



TBKBIODIESEL.COM The process of producing algae is really quite simple. Algae are grown in either open-pond or closed-pond systems. Once the algae have been harvested, the lipids (oils) are extracted from the walls of the algae cells.

There are different ways to extract oil from algae.

The "oil press" hydraulic presses and screw presses are the simplest, most popular method because it extracts up to 75% of the oil from the algae being pressed.

Another process is called the **Ethyl Acetate Solvent Extraction Method (Replaces Hexane Solvent)**.

In this method, the ethyl acetate solvent is combined with the pressed algae biomass, which then extracts up to 20% more oil. Algae BioMass Oil is extracted with Ethyl Acetate.

TBK BioDiesel biofuel is so simple to produce!

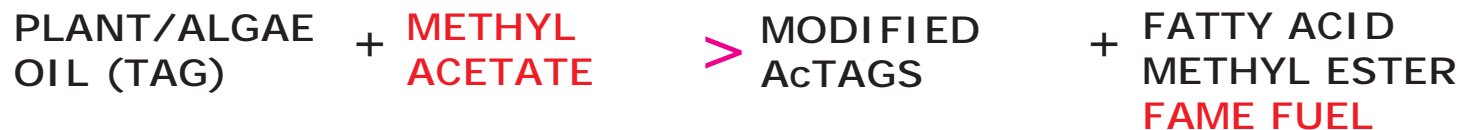
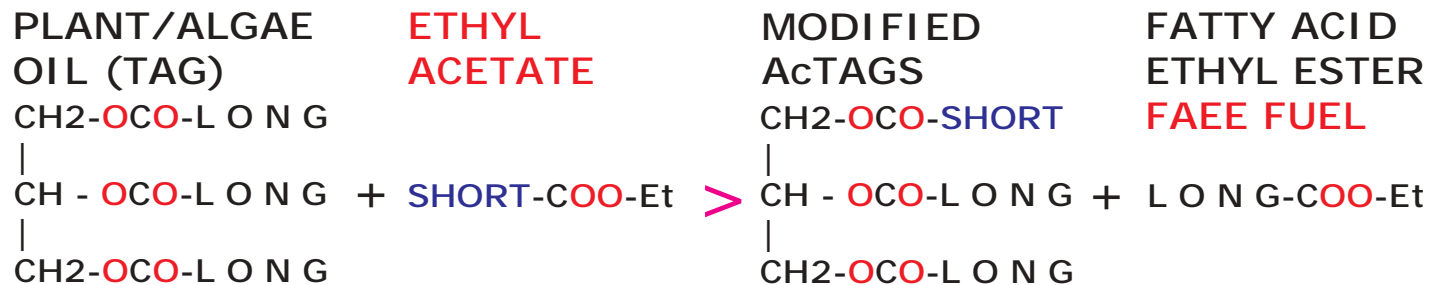
The feed stock is Plant/Algae Oil and Ethyl Acetate (or Methyl Acetate).

Using Ethyl Acetate Extraction gives you 10 - 20% more algae oil feedstock.

Our process creates FAEE Fuel and a Modified AcTag "Oxygenated Molecule".

There is **NO GLYCERINE** by product. Gives 10% more BioDiesel Fuel than FAME.

Lower Cost than making FAME B100 biofuel. **Lower Emissions NOx, HC, Smoke.**



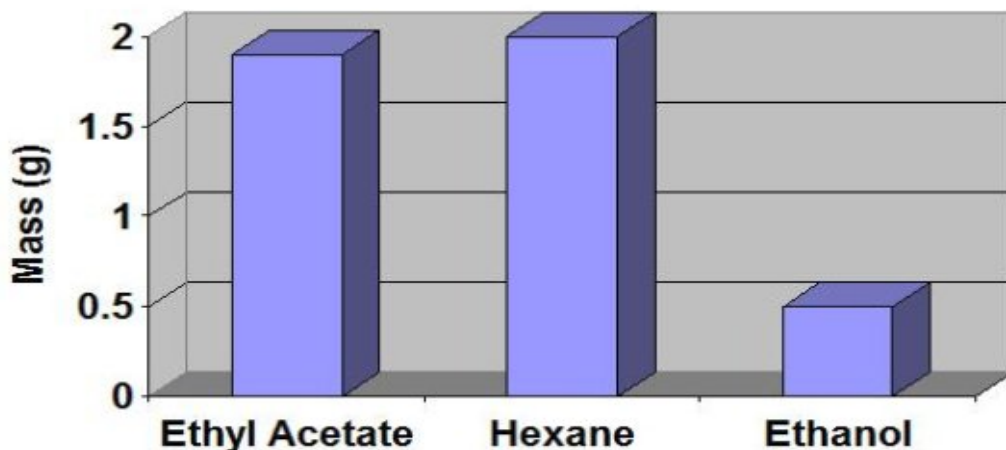
TBK BIODIESEL PROCESS HAS NO GLYCERINE BY-PRODUCT. **GIVES 10% MORE BIODIESEL FUEL**

TBK BIODIESEL + ALGAE OIL (TAG) + **ETHYL ACETATE** > MODIFIED AcTAGS + FATTY ACID ETHYL ESTER **FAEE FUEL**

TRADITIONAL BIODIESEL + ALGAE OIL (TAG) + **ETHANOL** > GLYCERINE 10% WASTE BY-PRODUCT + FATTY ACID ETHYL ESTER **90% FAEE FUEL**

Jatropha Oil Extraction

Mass of Oil Extracted by Solvent



Ethyl Acetate (EA), our interesterifying agent in the TBK BioDiesel reaction, can be used instead of hexane for oil extraction for plant and algae oils.

So with properly chosen EA volumes, this extract (Oil + EA) upon addition of catalyst, can be used straight for the TBK Biodiesel reaction, greatly improving on our economics.

So introducing this method at an oil mills, the EA + oil mixture is to be transported to TBK plants. And if we could do this with green Bio - EA and thus replacing petroleum-derived hexane, we would gain still more.

Jatropha Oil Extraction Procedure using Ethyl Acetate, Hexane, & Ethanol

High School Chemistry Laboratory Project
Of the three solvents, ethyl acetate and hexane were the easiest to evaporate following extraction, and ethanol was the hardest to remove. Ethanol 0.5 gms performed poorly following extraction, due to its non-polar and polar ends, and is not a good alternative to hexane.

Ethyl acetate 1.9 gms is an acceptable alternative to hexane 2.0 gms as it yielded a comparable amount of oil, and is possibly a more natural and sustainable method of jatropha oil extraction. Ethyl Acetate has low toxicity. Most Coffee beans and tea leaves are decaffeinated with Ethyl Acetate.

An alternative to hexane in extraction should be considered for two main reasons: first, hexane is a fossil fuel, the second largest component of natural gas next to methane. Secondly, the United States Environmental Protection Agency (EPA) now considers hexane a hazardous air pollutant (HAP). It is monitored and regulated under the Toxic Release Inventory (TRI) Program of the EPA.

Welcome to TBK-Biodiesel | www.tbkbiodiesel.com | 713-995-6110 | 1-800-221-6483 |

Imagine a biofuel that is ideal for existing diesel engines, does not use reagents derived from crude oil, does not use food feedstocks, is cheaper \$\$ to produce than Traditional "Transesterification" Biodiesel, is ideal as a fuel additive or a replacement fuel, has better fuel performance and lower emissions than PetroDiesel and BioDiesel.

TBK-BioDiesel Process chemically creates biofuel molecules that are a perfect drop-in replacement for #2 Diesel fuel. The "partial interesterification" of triglycerides (plant oil) and ethyl acetate (nail polish remover) produces a **Biofuel Mixture of FAEE & acetyl-TriAcylGlycerols (ac-TAGs)** i.e. Modified Triglycerides (Partially Acetylated TAG's).

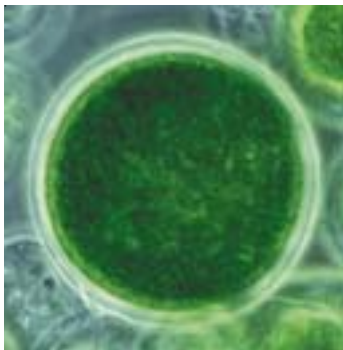


Burning Bush

GENETICS ROLE IN OILSEEDS From Burning Bush Euonymus Alatus

Michigan State University Scientists have discovered a gene in the Burning Bush seed that produces **acetyl triacylglycerides (acTAGs)**. This molecule has the same oil viscosity as #4 Diesel Fuel. They have taken these genes and put them into a modified mustard weed seed (cousin to canola). The modified mustard weed seeds yielded acetyl triacylglycerols (acTAGs) oil purity levels of up to 80 percent. Next they will try and put these genes in a crop plant to grow acetyl triacylglyceride plant oil that is a direct drop-in for Diesel # 4 fuel.

Transportation fuels require energy density from liquid fuels. The United States has roughly 176 biodiesel plants, though 80 percent of them are sitting idle because of high raw material costs. Many of the estimated 23,000 jobs in this industry will remain in jeopardy unless producers can install new process technology to process the available lower cost feedstocks. This is why algae oil research requires so much effort, because whoever comes to market first with cheap algae derived feedstock, will reap a good harvest.



ALGAE

FUTURE FUEL ALGAE BIODIESEL "Designer Drop-In #2 Diesel Fuel"

GENETIC ROLE IN ALGAE BIOFUELS

As soon as our geneticists succeed in altering the DNA of an oil-bearing algae strain to get the algae to secrete oils with short chains **acetyl triacylglycerides (acTAGs)**, the thing is solved.

This may take years, and until then let the TBK-Biodiesel chemically produce **acetyl triacylglycerides (acTAGs)** & FAEE BioDiesel fuel for you.



PetroDiesel



BioDiesel

The US burns approximately 17 million gallons of petrodiesel fuel a day.

TBK-BIODIESEL IS AN "OXYGENATED" FAEE BIO-FUEL

TBK-Biodiesel is an "Oxygenated" FAEE Biofuel having 30% more internal Oxygen content than conventional FAME BioDiesel B100. Today EPA requires gasoline blends in CA, TX with 10% ethanol. TBK-Biodiesel fuel is made with **10% Ethyl Acetate** an "ester of ethanol".

TBK-Biodiesel has better fuel emissions than B100 & PetroDiesel.

TBK-BIODIESEL "PARTIAL INTERESTERIFICATION" Oxygenated Fuel Lowers NOx, PM, & HC compared to PetroDiesel fuel based on Emissions Test Results from "Full Load" Diesel Engine Study. TBK-Biodiesel has **Lower NOx** (SMOG) than PetroDiesel Fuel. TBK-Biodiesel has **80% Lower Smoke & Soot** (PM) than PetroDiesel. TBK-Biodiesel has **Lower Unburnt HydroCarbon** (HC) than PetroDiesel.

BioDiesel FAME B100	TBK-BioDiesel
905-920 KG/M3 Density	900-930 KG/M3 Density
220 C Flash Point	>220 C Flash Point
35,000 KJ/KG Energy	39,000 KJ/KG Energy
4-6 Viscosity	5-6 Viscosity
100-120 Iodine Number	100-110 Iodine Number
+2 to +14C Cloud Point	-13 C Cloud Point



TBK produces "NO Glycerol" by-product

Janos Thesz holds two BioDiesel fuel samples:

Left side is dark colored "Conventional BioDiesel fuel" FAME (B100) with Glycerol at the bottom. Right side is light colored TBK-BioDiesel biofuel.

Solution to the Glycerol / Glycerine Glut

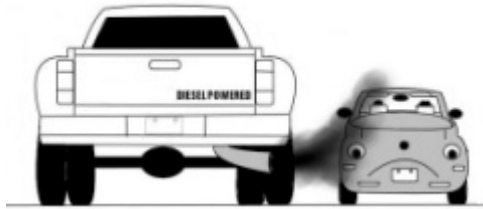
The problem with the current approach of making Biodiesel is the by-product glycerol. Glycerol is too viscous to be used as diesel fuel. By the year 2020, the volume of glycerol that will be produced with biodiesel will be six times more than the demand.

Oil Giant CHEVRON has applied for a patent to make "Similar BioDiesel Fuel" as us. Application No.: 12/639662 to use the by-product Glycerol in a process to create "**Low Melting Point Triglycerides for Use in Fuels**".

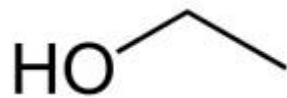
www.tbkbiodiesel.com

www.algaebiofuel.com

Second Hand Diesel Smoke! TBK-BioDiesel is a FAEE based advanced fuel that is 100% Biofuel

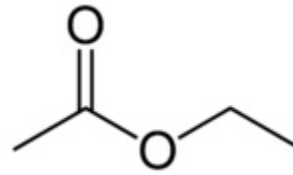


Performance and Emissions “Full Load” Diesel Truck tests are available comparing TBK-BioDiesel Fuel and PetroDiesel Fuel. Using TBK-BioDiesel “OXYGENATED” fuel lowers 3 Global Warming Gas Emissions, CO2, Methane, **Ozone (NOx) LOWER NOx THAN BIODIESEL & PETRODIESEL, HC , & 80% less Smoke / Soot Particulate Matter.**



Ethanol

Ethanol is a gasoline “oxygenated additive”. Today EPA requires gasoline blends with 10% ethanol.



Ethyl Acetate

TBK-Biodiesel fuel is made with 10% Ethyl Acetate an “ester of ethanol”. Ethyl Acetate (made from renewable ethanol) creates 2 extra **O**xxygen atoms in our TBK-BioDiesel Fuel.

B100 BioDiesel Fuel has 3 FAME fuel molecules with 6 "**O**" Oxygen Atoms. VISCOSITY 4-6 cSt

BioDiesel B100 Fuel



+



+



BIODIESEL B100 FAME LONG CHAIN

FATTY ACID METHYL ESTER

TBK-BioDiesel Fuel has 8 "**O**" Oxygen Atoms in a blend of FAEE Fuel and acetyl-triacylglycerols (ac-TAGs), i.e. Modified Triglycerides (Partially Acetylated TAG's), with No Glycerol by-product. Viscosity 5-6 cSt

The internal (8 "**O**" atoms) Oxygen content of our fuel is 30% greater than that of present FAME Biodiesel B100 (6 "**O**"), affording better combustion properties, & better emission profile.

TBK-BioDiesel FAEE Fuel Molecule



FAEE LONG CHAIN FATTY ACID ETHYL ESTER. THIS MOLECULE IS SIMILAR TO BIODIESEL B100

TBK-BioDiesel “O” “Oxygenated” Molecule



acetyl-TriAcylGlycerols (ac-TAGs)



THE FUTURE: **FUELING AMERICA WITHOUT PETROLEUM**

We have a Patent Pending “Chemical Pathway” to create a blend of biofuel molecules that perform better than #2 Diesel & B100 Biodiesel.

Today B100 BioDiesel is either FAME or FAEE Molecules.

The Future #2 Diesel Replacement Biofuel is TBK BioDiesel Fuel.

It's a mixture of **FAEE** and **Acetyl-Triacylglycerols** (ac-TAGs), i.e. Modified Triglycerides (Partially Acetylated TAG's)

Recycle Glycerol - Our “Chemical Pathway” works so well that Oil Giant Chevron is copying our “Chemical Pathway” creating FAME and Modified Triglycerides (Partially Acetylated) from waste Glycerol.

TBK BioDiesel Process can modify future “Bio-Fuel Oils” from GM Plants & Algae into “Drop In” Fuels.

GM Plant Crop BioOil Fuel biological pathway to acTAGs & GM Bacteria biological pathway to FAEE

Acetyl-Triacylglycerols (ac-TAGs) molecules may come from a biological pathway through genetic modified plants such as the burning bush. Michigan State University

MicroDiesel BioFuel (FAEE) : Engineered bacteria could be used to make FAEE biodiesel completely from food crops (or non-food oil crops), without relying on fossil fuels (as biodiesel does).

GMO: Might be much easier to get the plant genes to produce “light weight” acetyl-triglycerides (“natural structures”) than convincing them to synthesize FAME/FAEE (“unnatural structures”).

GM Algae BioOil Fuel

In the future, geneticists will succeed in altering the DNA of an oil-bearing algae strain to get the algae to secrete oils with short chain acetyl-triglycerides with the correct carbon chain length and degree of saturation.

Extract Algae Oil from Algae Bio-Mass with Ethyl Acetate. Ethyl Acetate has low toxicity and biodegradable. Coffee beans and tea leaves are decaffeinated with Ethyl Acetate. Our ethyl-acetate extraction ability can connect TBK Biodiesel with algae oil producers, as the hexane-extraction process is a great burden for them.